BUSINESS SUSTAINABILITY PRACTICE (BSP) PROFILE ASSESSMENT IN MALAYSIA ECONOMIC SECTORS USING K-MEAN CLUSTERING APPROACH

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SUPERVISOR'S DECLARATION

I hereby declare that I have checked this thesis and in my opinion, this thesis is adequate in terms of scope and quality for the award of the degree of Master of Science.

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STUDENT'S DECLARATION

I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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ABSTRAK

Dalam tahun-tahun kebelakangan ini, planet kita menghadapi cabaran sosial, alam sekitar dan ekonomi yang besar. Sementara itu, hanya 40% syarikat yang berdaftar di Bursa Malaysia membenamkan konsep kemapanan dalam keseluruhan projek atau perniagaan mereka kerana kurang penyertaan dan kesedaran mengenai kemampanan seperti yang dilaporkan dalam Demokrasi Indeks Alam Sekitar (EDI), Indeks Pembangunan Berkelanjutan (SDI) dan Indeks Perkembangan Manusia (HDI). Oleh itu, tiada kelebihan persaingan di kalangan Sektor Ekonomi Malaysia telah dicapai. Di Malaysia, terdapat hanya beberapa kajian akademik atau laporan perniagaan yang membawakan bagaimana beberapa syarikat yang menggabungkan kelestarian dalam perniagaan mereka. Untuk mengatasi masalah ini dan mencapai amalan kemampanan yang lebih baik, teknik integrasi Amalan Keberlanjutan Perniagaan (BSP) dicadangkan untuk menilai prestasi BSP dengan menggunakan pendekatan K-Mean clustering dan pengesahan keputusan menggunakan kaedah Pakar Elicitasi. Dari percubaan ini, jurang antara elemen amalan pengetahuan dan kesedaran ditingkatkan melalui panduan yang betul, dan teknik ini diakui oleh para pakar. Dari kajian ini terdapat dua hasil utama yang merupakan perkembangan BSP bersepadu yang mengaitkan persepsi (sikap) dan pengetahuan melalui pemetaan antara Matlamat Pembangunan Kemampanan (SDG) dan Pengurusan Projek Hijau (GPM); kedua, pengklasifikasian dan profil sektor terhadap amalan kemampanan yang ditunjukkan dengan mantap dalam kesedaran tetapi terhad kepada pengetahuan tentang kemampanan. Ianya berada dikelompok yang terletak di kuadran pertama dan kedua. Kemudian prestasi BSP yang terbaik adalah sektor perlombongan dan kuari yang pada keadaan mantap dalam amalan mapan iaitu gabungan antara atribusi planet yang terdapat sub-atribusi pengangkutan, tenaga, air, sisa, dan bahan dan perolehan. Sebaliknya, pertanian menunjukkan trend yang tidak menentu untuk setiap atribusi berbanding sektor-sektor lain. Maklum balas bersama telah dipersetujui dengan sistem bersepadu untuk Amalan Keberlanjutan Perniagaan (BSP) yang didapati dalam penemuan pertama sebagai penyelesaian untuk prestasi ekonomi Malaysia dan profil BSP untuk penemuan kedua, di mana 100% maklum balas bersetuju dengan kedua-dua penemuan penyelidikan yang dilaksanakan. Maklum balas daripada pakar adalah penemuan penyelidikan ini adalah salah satu inisiatif yang baik dengan yang demikian akan digunakan dalam aplikasi yang lebih luas untuk mempromosikan kelebihan persaingan antara sektor ekonomi di Malaysia. Sekarang, sudah tiba masanya untuk setiap perniagaan di setiap sektor dan industri di Malaysia mengambil tindakan serius yang akan meningkatkan kesedaran dan meningkatkan kedudukan indeks Malaysia menjadi diantara negara maju pada masa akan datang.

ABSTRACT

In recent years, our planet faces massive social, environment and economical challenges. Meanwhile, only 40% of the companies registered in Bursa Malaysia embed a sustainability concept in their whole projects or businesses due to lack of participation and awareness on sustainability as reported in the Environmental Democracy Index (EDI), Sustainable Developement Index (SDI) and Human Developement Index (HDI). Therefore, no competitive edge among Malaysia Economic Sectors has been achieved. In Malaysia, there were only several academic studies or business reports presenting how a few companies that incorporate sustainability in their businesses nature. In order to combat these issue and achieve a better sustainability practices, an integration technique of the Business Sustainability Practice (BSP) was proposed to assess the BSP performance by using the K-Mean clustering approach and result validation using the Expert Elicitation method. From this attempts, the gap between the practice elements of knowledge and consciousness is improved through proper guidance, and this technique is acknowledged by the experts. From this research there are two main results which are the development of an integrated BSP which associate the perceptional (attitudinal) and knowledge through mapping between Sustainability Development Goals (SDG) and Green Project Management (GPM); secondly, the clustering and sector profiling on sustainability practice shown steadfast in consciousness but limited in knowledge of sustainability. Most of the clusters were located at the first and second quadrant. Then the best BSP performance is mining and quarrying's sector which at steady state in sustainable practice with fully incorporated at planet's attribution which are transport, energy, water, waste, and material and procurement. In contrast, the agriculture shows volatile trend for every attribution rather than other economic sectors. The collective feedback was agreed with the integrated system for Business Sustainability Practice (BSP) as found in the first finding as the solution for the Malaysian economic performance and the BSP profile for the second finding, where 100% of feedback agreed with both research findings to be implement later on. The feedback from the expert is this research finding is one of the good imitative thus will use in wider application to promote the competitive edge among Malaysia economic sectors in Malaysia. Now, it is time for every business in every sector and industry in Malaysia to take a serious action that will improve awareness and enhance Malaysia's index rank to be among developed countries in the future.

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LIST OF SYMBOLS

λ	Attitudinal parameter
ϵ	Epsilon variance
R’	Normalized Value
R	Raw Data Value
R_{max}	Maximum Raw Data Value
m	Average or Arimatic Mean
x_n	Maximum number of respondents
n	Number of respondent
k	Number of cluster
d_{ij}	Correlation distance
d_{mj}	Centroid linkage or distance matrix
$d\ (i,k)$	Euclidean distance
ρ_{ij}	Pearson product moment correlation between i and j
N_k, N_l, N_m	Number of observations in clusters k, l and m
d^2	Squared Euclidean Distance
r	Pearson Correlation
$\bar{x}$	Mean Value

LIST OF ABBREVIATIONS

ADB	Asian Development Bank
BSP	Business Sustainability Practice
CAGR	Compound Annual Growth Rate
CSR	Corporate Social Responsibility
DOSM	Department Of Statistic Malaysia
EDI	Environment Development Index
EIA	Environmental Impact Assessment
EPSP	Economic Performance and Social Progress
ETP	Economic Transformation Programme
GDP	Gross Domestic Product
GPM	Green Project Management
HDI	Human Development Index
MDG	Millennium Development Goal
NGO	Non-Government Organization
NKEA	National Key Economic Area
OECD	Organization for Economic Co-operation and Development
PRINCE	Projects in Controlled Environment
PRISM	Project Integrating Sustainable Methods
SDG	Sustainable Development Goal
SDIs	Sustainability Development Indexes
UN	United Nation
WCED	World Commission on Environment and Development
WRI	World Resources Institute
WI	Work Instruction
SOP	Standard Operating Procedure
OPL	One Point Lesson
MIDA	Malaysian Investment Development Authority

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